

US Army Corps of Engineers
Safety and Occupational Health

EM 385 SAFETY AND HEALTH REQUIREMENTS MANUAL

SECTION 19

19. FLOATING PLANT AND MARINE ACTIVITIES

19.A GENERAL

19.A.01 Floating plant inspection and certification.

a. All floating plant that are regulated by the USCG shall have current inspections and certificates issued by the USCG before being placed in service and a copy shall be posted in a public area on board the vessel. A copy of any USCG Form 835 issued to the vessel in the preceding year shall be available to the designated authority and a copy shall be on board the vessel.

b. All dredges and quarter boats not subject to USCG inspection and certification or not having a current American Bureau of Shipping (ABS) classification shall be inspected in the working mode annually by a marine surveyor accredited by the National Association of Marine Surveyors (NAMS) or the Society of Accredited Marine Surveyors (SAMS) and having at least five years experience in commercial marine plant and equipment, All other plant shall be inspected annually by a qualified person. The inspection shall be documented, and a copy of the most recent inspection report shall be posted in a public area on board the vessel and a copy shall be furnished to the designated authority upon request. The inspection shall be appropriate for the intended use of the plant and shall, as a minimum, evaluate structural integrity and compliance with NFPA 302, Fire Protection Standard for Pleasure and Commercial Motor Craft.

c. When any floating plant is brought onto the job site, before it is placed in service it shall be determined to be in safe operating condition.

d. Periodic inspections and tests shall assure that a safe operating condition is maintained.

e. Records of inspections shall be maintained at the site and shall be available to the designated authority.

f. Floating plant found in an unsafe condition shall be taken out of service and its use prohibited until unsafe conditions have been corrected.

19.A.02 Personnel qualifications.

a. Officers and crew shall be in possession of a current, valid USCG license, which shall be posted in a public area on board the vessel, or correctly endorsed document as required by the USCG.

b. Government operators shall be licensed or certified in accordance with the requirements outlined in ER 385-1-91.

Officers and crew of floating plant shall be licensed and/or documented by the USCG when the plant is subject to one or more of the following criteria:

(1) the vessel is inspected and certified by USCG in accordance with ER 1125-2-304, Appendix I, Inspection and Certification Agreement;

(2) the vessel is normally engaged in or near a channel or fairway in operations that restrict or affect navigation of other vessels and required by law to be equipped with radio-telephones of the 156-162 band frequency; or

(3) floating plant is engaged in the transfer of oil or hazardous material in bulk.

c. A USCG Radar Observers endorsement on licenses is required for all Operators of Uninspected Towing Vessels, Masters, and Pilots on radar-equipped vessels 8 m (26 ft) or more in length. Endorsements must be issued from a USCG approved training facility.

d. Government operators of floating plant which does not meet the criteria of paragraph 19.A.02b(1) shall be licensed and certified in accordance with the requirements of ER 385-1-91. Licensing and certification will be performed by a qualified individual designated as the USACE Command's marine licensing official.

19.A.03 Severe weather precautions.

a. Where floating plant may be endangered by severe weather - including sudden and locally severe weather, storms, high winds, hurricanes, and floods - plans shall be made for removing or securing plant and evacuation of personnel in emergencies. This plan shall be part of the activity hazard analysis and shall include at least the following:

(1) a description of the types of severe weather hazards the plant may potentially be exposed to and the steps which will be taken to guard against the hazards,

(2) the time frame for implementing the plan (using as a reference the number of hours remaining for the storm to reach the work site if it continues at the predicted speed and direction), including the estimated time to move the plant to the safe harbor after movement is started,

(3) the name and location of the safe location,

(4) the name of the vessels which will be used to move any non-self-propelled plant, and their type, capacity, speed, and availability, and

(5) river gage readings at which floating plant must be moved away from dams, river structures, etc., to safe areas.

b. Extended movement of floating plant and tow shall be preceded by an evaluation of weather reports and conditions by a responsible person to ascertain that safe movement of the plant and tow can be accomplished.

c. Work or task orders shall be preceded by an evaluation of weather reports and conditions by a responsible person to ascertain that safe working conditions exist and safe refuge of personnel is assured.

d. USCG approved PFD (type I, II, III, or V) shall be worn by all personnel on decks exposed to severe weather, regardless of other safety devices used.

e. A sufficient number of vessels of adequate size and horsepower, each designed, outfitted, and equipped for towing service, shall be available at all times to move both self- and non self-propelled plant against tides, current, and winds during severe weather conditions.

f. Contractors working in an exposed marine location shall monitor the NOAA marine weather broadcasts and shall use other local commercial weather forecasting services as may be available.

g. Floating plant will not operate in a channel entrance or in open or exposed waterways that experience known changes in sea state conditions that could exceed the plant's seaworthy capability.

19.A.04 Emergency planning.

a. Plans shall be prepared for response to marine emergencies such as fire, sinking, flooding, severe weather, man overboard, hazardous materiel incidents, etc. > See Section 01.E

b. A station bill, setting forth the special duties and the duty station of each crew member for various emergencies, shall be prepared and posted in conspicuous locations throughout the vessel.

c. Each crew member shall be given a written description of, and shall become familiar with, his/her emergency duties and shall become familiar with the vessel's emergency signals.

d. "Abandon ship/boat" and "person overboard" procedures shall include instructions for mustering personnel.

e. On all floating plant which have a regular crew or on which people are quartered, the following drills shall be held at least monthly during each shift (unless the vessel is required, under USCG regulations, to be drilled more frequently): abandon ship/boat drills, fire drills, and person overboard or rescue drills.

(1) The first set of drills shall be conducted within 24 hours of the vessel's occupancy or commencement of work.

(2) Where crews are employed or quartered at night, every fourth set of drills shall be at night; the first set of night drills shall be conducted within the first two weeks of the vessel's occupancy.

(3) Drills shall include, where appropriate, how to handle a pump shell or pipe rupture or failure within the hull (proper shutdown procedures, system containment, etc.) and how to handle leaks or failures of the hull or portions of it (what compartments to secure, how to handle power losses, pulling spuds to move to shallow water, etc.).

f. Person overboard or rescue drills shall be held at least monthly at boat yards, locks, dams, and other locations where marine rescue equipment is required.

g. Emergency lighting and power systems shall be operated and inspected at least monthly to ensure proper operation.

(1) Internal combustion engine driven emergency generators shall be operated under load for at least 2 hours each month.

(2) Storage batteries for emergency lighting and power systems shall be tested at least once every 2 months.

h. A record of all drills and emergency system checks, including any deficiencies noted in equipment and corrective action taken, shall be made in the station log.

19.A.05 Equipment requirements.

a. Fenders shall be provided to prevent damage and sparking and to provide safe areas for workers exposed to pinching situations caused by floating equipment.

b. Axes or other emergency cutting equipment shall be provided in accessible positions on all towing vessels for use such as freeing lines.

c. A signal device shall be provided on all vessels to give signals required by the navigation rules applicable to the waters on which the vessel is operated.

d. All controls requiring operation in cases of emergency - such as boiler stops, safety valves, power switches, fuel valves, alarms, and fire extinguishing systems - shall be located so that they are protected against accidental operation but are readily accessible in an emergency.

e. Electric lights used on or around gasoline and oil barges or other marine locations where a fire or explosion hazard exists shall be explosion-proof.

f. General alarm systems shall be installed and maintained on all floating plant where it is possible for either a passenger or crewman to be out of sight or hearing from any other person.

(1) Where general alarm systems are used they shall be operated from the primary electrical system with standby batteries on trickle charge that will automatically furnish the required energy during an electrical-system failure.

(2) A sufficient number of signaling devices shall be placed on each deck so that they can be distinctly heard above the normal background noise at any point on the deck.

(3) All signaling devices shall be so interconnected that actuation can occur from at least one strategic point on each deck.

h. Smoke alarms are required for all living quarters of floating plant; smoke alarms, if wired, should use the same electrical system as that of the electrical alarms.

i. All doors shall be capable of being opened from either side and provided with positive means to secure them in both the open and closed position.

j. Escape hatches and emergency exits shall be marked on both

sides with letters, at least 2.5 cm (1 in) high, stating "EMERGENCY EXIT - KEEP CLEAR."

k. Each prime mover (engine, turbine, motor) driving a dredge pump shall be capable of being stopped by controls remote from the prime mover locations.

l. Shore power receptacles shall have a grounding conductor to prevent potential difference between the shore and the vessel.

m. Circuits with GFCI protection shall be provided in grounded 120 volt or 240 volt systems in toilet/shower spaces, galley, machinery spaces, weather deck, exterior, or near any sinks.

n. Where appropriate, vessels should have watertight compartments readily identified and properly maintained in a watertight condition (i.e., sealable doors in place and fully functional) and all penetrations maintained in a watertight condition.

19.A.06 Fuel systems and fuel transfers.

a. Gauge glasses or try cocks shall not be installed on fuel tanks or lines unless they meet the requirements of 46 CFR 58.50-10.

b. A shutoff valve shall be installed at the fuel tank connection: arrangement shall be made for operating this valve from outside the compartment in which the tank is located and from outside the engine compartment and outside the house bulkheads at or above the weather deck of the vessel.

c. A shutoff valve shall be installed at the engine end of the fuel line unless the length of the supply pipe is 1.8 m (6 ft) or less. Arrangement shall be made for operating this valve from outside the house bulkheads, at or above the weather deck on the vessel.

e. All carburetors on gasoline engines shall be equipped with a backfire trap or flame arrestor.

f. All carburetors, except down draft type, shall be provided with a drip pan, with flame screen, which is continuously emptied by suction from the intake manifold or by a waste tank.

g. Fuel and lubricant containers and tanks shall be diked or curbed to contain the tank contents in case of leakage in accordance with NAVFAC DM-22, Petroleum Fuel Facilities. In lieu of a dike or curb, other means complying with USCG requirements in 46 CFR Parts 64, Marine Portable Tanks, and 98.30, Handling and Storage of Portable Tanks, may be used.

h. Fuel oil transfers for floating plant shall be in accordance with the provisions of USCG regulations, 46 CFR and 33 CFR Parts 155 and/or 156. For uninspected vessels, USCG regulations in 33 CFR 156.120 and 33 CFR 155.320 for fuel coupling devices and fuel oil discharge containment apply. Venting fuel tanks is necessary when using the couplings prescribed by 33 CFR 156.120(1) or (2).

19.A.07 Safe practices.

a. Obstructing cables/lines which cross waterways between floating plant or between plant and mooring shall be clearly marked.

b. On all floating plant where people are quartered, one person shall be on watch at all times to guard against fire and provide watch person service. In lieu of a watch person, an automatic fire detection and fire and emergency warning system(s) may be used.

c. Provisions shall be made to prevent accumulation of fuel and grease on floors and decks and in bilges.

d. Swimming shall be prohibited for all personnel on floating plant and other marine locations, except certified divers in the performance of their duties, unless necessary to prevent injury or loss of life.

e. A person in the water shall be considered as a person overboard and appropriate action taken.

f. When barriers or blanks are installed in piping systems as a lock-out procedures, positive means - such as protruding handles - shall be used to easily recognize their presence. All barriers shall be marked - including name of installer, name of inspector, and date of installation - and accounted for prior to installation and subsequent to removal.

g. Deck loading will be limited to safe capacity. Loads will be secured and holdbacks or rings will be provided to secure loose equipment during rough weather.

h. Guardrails, bulwarks, or taut cable guardlines shall be provided for deck openings, elevated surfaces, and similar locations where persons may fall or slip from them. Guardrails and taut cable guardlines shall comply with the requirements for standard guardrails. > See Section 21.B

I. Projection and tripping hazards shall be removed, identified with warning signs, or distinctly marked with safety yellow.

j. Deck cargo carried on fuel barges shall be placed on dunnage.

k. When two or more pieces of floating plant are being used as one unit, they shall be securely fastened together to prevent openings between them or the openings shall be covered or guarded.

l. All anchor points shall be clearly identified and shall be inspected prior to applying a load or putting cables under tension. Anchor points not structurally sound shall be cut out, removed, and/or welded over to preclude usage. Visual checks and "all clear" warnings shall be made prior to tensioning cables.

19.A.08 Confined spaces. > See Section 06.I

a. Every floating plant shall be surveyed for the presence of confined spaces. A list of all confined spaces shall be maintained on board the vessel/floating plant: on those vessels without a location to maintain the list (e.g., a barge), the list shall be maintained at the worksite.

b. All permit-required confined spaces on floating plant shall be indicated with a sign or placard, or similar device.

19.A.09 When there is a potential for marine activities to interfere with or damage utilities or other structures, including those underwater, a survey shall be conducted to identify the utilities or structures in the work area, analyze the potential for interference or damage, and recommend steps to be taken to prevent the interference or damage.

19.A.10 Ventilation.

a. All motor vessels or boats powered by internal combustion engines having electric spark ignition systems or having auxiliary engines of this type in cabins, compartments, or confined spaces shall be equipped with an exhaust fan(s) for ventilating engine space and bilges.

b. At least two ventilators fitted with fans capable of ventilating each machinery space and fuel tank compartment, including bilges, shall be provided to remove any flammable or explosive gases, except those vessels constructed with the greater portions of the bilges open or exposed to the natural atmosphere at all times. > Note this requirement does not apply to diesel engines

c. Other compartment spaces within a vessel, not covered in this section, may be naturally vented.

d. All living spaces, including the galley, shall be adequately ventilated in a manner suitable to the purpose of the space.

e. For launches and motorboats having diesel power plants not equipped with fans, ventilating shall be by natural draft through permanently open inlet and outlet ducts extending into the bilges. Inlet and exhaust ducts shall be equipped with cowls or exhaust heads.

f. Vent and ventilator requirements.

(1) Fans shall be rated for Class I hazardous locations and located as remotely from potential explosive areas as practical.
> See Section 11.G

(2) The vent intake shall extend to within 0.3 m (1 ft) of the bottom of the compartment.

(3) Means shall be provided for stopping all fans in ventilation systems serving machinery components and for closing all doorways, ventilators, chases, and annular spaces around tunnels and other openings from outside these spaces in case of fire.

g. Engines shall not be started until the engine space and bilges have been ventilated to remove fuel vapor.

19.A.11 The latest information published by the USCG regarding aids to navigation shall be maintained aboard vessels 8 m (26 ft) or more in length.

19.B ACCESS

19.B.01 General. > See also 19.A.07h

a. All means of access shall be properly secured, guarded, and maintained free of slipping and tripping hazards. > See Section 21

b. Nonslip surfaces shall be provided on all working decks, stair treads, ship ladders, platforms, catwalks, and walkways, particularly on the weather side of all doorways opening on deck.

c. Grab bars shall be provided on the sides of superstructure of tugs, tenders, and launches except where railing is present. Grab bars will be placed as close as possible to 42 inches above the deck.

d. Double rung or flat tread type Jacob's ladders shall be used

only when no safer form of access is practical: when in use, they shall hang without slack and be properly secured.

19.B.02 Access to/from vessels.

a. Safe means for boarding or leaving a floating plant shall be provided and guarded to prevent persons from falling or slipping thereon.

b. A stairway, ladder, ramp, gangway, or personnel hoist shall be provided at all personnel points of access with breaks of 48 cm (19 in) or more in elevation.

c. Ramps for access of equipment and vehicles to or between vessels shall be of adequate strength, provided with side boards, and be well maintained.

d. Gangways and ramps shall be:

(1) secured at one end by at least one point on each side with lines or chains to prevent overturning,

(2) supported at the other end in such a manner to support them and their normal loads in the event they slide off their supports,

(3) placed at an angle no greater than that recommended by the manufacturer, and

(4) provided with a standard guardrail (toeboards are optional depending on their usefulness and the hazard involved). > See Section 21.B

19.B.03 Access on vessels.

a. Vertical access shall be provided between various decks by means of stairs or permanent inclined ladders.

b. Employees shall not be permitted to pass fore and aft, over, or around deck loads unless there is a safe passage.

c. If cargo or materials are stored on deck of barges, scows, floats, etc., the outboard edge shall not be used as a passageway unless at least 0.6 m (2 ft) of clearance is maintained.

19.B.04 Emergency access.

a. All vessels, except those easily boarded from the water, shall provide at least one portable or permanent ladder of sufficient length to rescue a person overboard.

- b. Two means of escape shall be provided for normal work, assembly, sleeping, and messing areas on floating plants.
- c. Means of access shall be maintained safe and functional.

19.B.05 Access on floating pipelines.

- a. All floating pipelines used as accessways shall be equipped with a walkway and handrail on at least one side.
- b. Walkways shall be at least 50 cm (20 in) wide and anchored to the pipeline. The use of PFDs is also required. > See Section 05.I
- c. When walkways and handrails are not provided (i.e., the pipeline is not intended for access), the pipeline shall be barricaded at both ends to prevent access by any person.

19.C LAUNCHES, MOTORBOATS, AND SKIFFS

19.C.01 Crew requirements.

- a. In the following circumstances a qualified employee shall be assigned to assist with deck duties:

- (1) when extended trips including overnight trips are made from the work site,

- (2) when conditions of navigation make it hazardous for an operator to leave the wheel while underway,

- (3) when operations being performed, other than tying-in, require the handling of lines,

- (4) when operating at night or during inclement weather, or

- (5) when towing.

- b. A qualified employee is any individual who has established, to the satisfaction of the operator of the vessel, that he/she is physically and mentally capable of adequately performing the deck duties to which he/she may be assigned.

19.C.02 Personnel and cargo requirements.

- a. The maximum number of personnel and weight that can safely be transported shall be posted on all launches, motorboats, and skiffs. The number of personnel (including crew) shall not exceed

the number of PFDs aboard.

b. Each boat shall have sufficient room, freeboard, and stability to safely carry the cargo and number of passengers allowed with consideration given to the weather and water conditions in which it will be operated.

19.C.03 Fire protection.

a. The minimum number and rating of fire extinguishers which shall be carried on all launches and motorboats, including outboards, are as follows:

Table: Fire Extinguishers

b. All launches and motorboats having gasoline or liquid petroleum gas power plants or equipment in cabins, compartments, or confined spaces shall be equipped with a built-in automatic CO2 or other equally effective type of fire extinguishing system.

19.D DREDGING

19.D.01 Prior to repair or maintenance on the pump, suction or discharge lines below the water line, or within the hull, the ladder (or drag arm) shall be raised (above the waterline) and positively secured. This provision is in addition to the normal securing of hoisting machinery. Blank or block plates shall also be set in suction or discharge lines as appropriate.

19.D.02 Dredge pipelines that are floating or supported on trestles shall display appropriate lights at night and in periods of restricted visibility in accordance with USCG regulations and 33 CFR 88.15.

19.D.03 Submerged and floating dredge pipeline.

a. Submerged pipeline shall rest on the channel bottom where a pipeline crosses a navigation channel and while submerged; the top of the pipeline and any anchor securing the pipe shall be no higher than the required project depth for the navigation channel in which the pipe is placed.

(1) Whenever buoyant or semi-buoyant pipeline is used, the dredge operator will assure that the pipeline remains fully submerged and on the bottom; whenever it is necessary to raise the pipeline, proper clearances shall be made and maintained and the entire length of the pipeline will be adequately marked.

(2) The location of the entire length of submerged pipeline shall be marked with signs, buoys, lights, or flags as required by the USCG and as approved by the Designated Authority.

(3) Routine inspections of the submerged pipe shall be conducted to ensure anchorage.

(4) All anchors and related material shall be removed when the submerged pipe is removed.

b. Floating pipeline is any pipeline which is not anchored on the channel bottom. Floating pipeline, to include rubber discharge hoses, shall be clearly marked.

c. Pipelines shall not be permitted to fluctuate between the water surface and the channel bottom or lie partially submerged.

19.D.04 Dredges shall be designed so that a failure or rupture of any of the dredge pump components, including dredge pipe, shall not cause the dredge to sink. Data or plans supporting this capability must be available to the government representative upon request.

19.D.05 Mobilization, demobilization, and relocation of dredges, support barges, support tenders, tugs, and heavy equipment shall be by qualified persons under the direct supervision of a responsible individual.

19.D.06 Hopper dredges shall offer a safe means and process to load and unload personnel.

19.D.07 Any dredge which has a dredge pump below the waterline shall have a bilge alarm or shutdown interface.

19.D.08 Covers of "stone boxes" shall be secured with at least two positive means when the boxes are working under positive pressure.

19.E NAVIGATION LOCKS AND LOCKING

19.E.01 Smoking, the use of open flame equipment, or other ignition sources shall be prohibited on lock structures within 50 feet of vessels containing flammable or hazardous materials during lockage.

19.E.02 Pleasure and commercial recreational craft shall not be locked through a lock chamber with a vessel containing dangerous, flammable, or hazardous cargo.

a. Simultaneous lockage of two vessels or tows carrying dangerous cargoes containing flammable vapors, or simultaneous lockage of another vessel or tow carrying non-dangerous cargoes and vessel or tow carrying dangerous cargoes, shall not be permitted when river traffic in the approaches to a lock is light.

b. When the river approaches to a lock are congested, simultaneous lockage of the aforementioned vessels or tows, other than pleasure craft, shall be permitted provided:

(1) the first vessel or tow in and the last vessel or tow out are secured before the other enters or leaves;

(2) any vessel or tow carrying dangerous cargoes is not leaking; and

(3) all masters involved have agreed to the joint use of the lock chamber.

Vessels with flammable or highly hazardous cargo will be passed separately from all other vessels. Hazardous materials are described in Part 171, Title 49, Code of Federal Regulations; flammable materials are defined in the National Fire Code of the NFPA.

DEFINITIONS

Floating plant: includes marine vessels use to transport personnel, work boats, floating cranes and derricks, barges, patrol boats, etc.

Gangway: any ramp, stairway, or ladder provided for personnel to board/leave a vessel.

Vessel: every type of watercraft or artificial contrivance used, or capable of being used, as a means of transportation on water, including special-purpose floating structures not primarily designed for or used as a means of transportation on water.